DOCUMENT RESUME

ED 284 741 SE 048 286

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TITLE Funded High School Math Skills Program 1985-86. End-of-Year Report. OEA Evaluation Report.
INSTITUTION New York City Board of Education, Brooklyn, N.Y.
PUB DATE Jun 87
NOTE 19p.
AVAILABLE FROM New York City Board of Education, Office of Educational Assessment, 110 Livingston St., Brooklyn, NY 11201.
PUB TYPE Reports - Descriptive (141) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Basic Skills; Computer Uses in Education; *Evaluation Criteria; *Mathematics Achievement; Mathematics Curriculum; Mathematics Education; *Mathematics Instruction; *Mathematics Skills; Mathematics Tests; Programing; Programing Languages; Remedial Instruction; *Remedial Programs; Secondary Education; *Secondary School Mathematics
IDENTIFIERS *New York City Board of Education

ABSTRACT

The Math Skills Program of the New York City Public Schools is designed to provide remediation in mathematics for students who have mathematics scores that are two or more years below grade level, or who have failed the Mathematics Regents Competency Test. During the 1985-86 school year, 58,192 students from 113 high schools participated in the program. This document describes the program and provides an assessment of the progress of its participants. It contains information on: (1) the program's background and objectives; (2) the evaluation procedures used and the scope of this evaluation report; (3) student eligibility and testing; (4) student programming; (5) staffing and training; (6) the use of the BASIC computer language in a pilot project; and (7) the results of the program (for both full-time and half-year students). Conclusions reported in the document state that the program was successful during the 1985-86 school year in meeting its central skills development objectives for both full- and half-year students. (TW)

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FUNDED HIGH SCHOOL
MATH SKILLS PROGRAM
1985-86
END-OF-YEAR REPORT

OEA Evaluation Report

Evaluation Section Report
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Project Numbers: 5001-56-61623
5001-56-61624
5001-56-61628

June, 1987

FUNDED HIGH SCHOOL MATH SKILLS PROGRAM 1985-86 END-OF-YEAR REPORT

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SUMMARY

The 1985-86 Funded High School Math Skills Program was successful in meeting its central skills development objectives. The program met its evaluation objectives for both full- and half-year students. Of students with valid scores, approximately 70 percent of full-year students and 81 percent of half-year students met the evaluation objective. At the same time, the low percentage of students reporting both pretest and posttest results continued to raise questions about the usefulness of these data as a measure of program success.

The Math Skills Program continued to provide a range of educational approaches to the teaching of basic skills. During the 1985-86 school year, it extended the implementation of its BASIC for Basic Math Skills pilot project. Because computers are playing an increasingly important role in schools and in the larger society, this pilot project was designed to help teachers explore ways to use computers to teach students basic math skills.

Based on the evaluation findings, the following recommendations are made:

- Program teachers should establish procedures so that absent students can take C.R.T.s.

- The Math Skills Program should continue to develop innovative pilot projects.

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I. INTRODUCTION

PROGRAM BACKGROUND

The Math Skills Program provides remediation in mathematics for students who have mathematics scores two or more years below grade level or who have failed the Mathematics Regents Competency Test (R.C.T.).* During the 1985-86 school year, 58,192 students from 113 high schools participated in the Math Skills Program. This program is funded by Chapter I and by Pupils with Special Educational Needs (P.S.E.N.).** The Office of Educational Assessment/High School Evaluation Unit (O.E.A./H.S.E.U.) annually reviews this program and provides qualitative and quantitative data about it.***

PROJECT OBJECTIVES

The Math Skills Program has a number of overall objectives. This report focuses on the following performance objectives:

- Seventy percent of the full-year program participants will show an improvement on posttest Normal Curve Equivalent (N.C.E.) scores.****

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*Students must pass the R.C.T. in order to graduate from high school.

**A school is eligible for federal Chapter I funds according to a complex formula whereby a specified proportion of its student body either qualifies for the free lunch program or belongs to a family that qualifies for Aid to Families with Dependent Children (A.F.D.C.); it is eligible for New York State P.S.E.N. funds if its student body fails to meet certain academic standards.

***Previous years' reports are available from O.E.A./H.S.E.U.

****N.C.E. scores indicate a student's grade level relative to a representative sample of students in the nation. The N.C.E. scale is similar to percentiles. It provides a standard against which students at a specific grade level are compared.

- Seventy percent of less than full-year program participants will master one skill for every 20 days of instruction as measured by the Math Skills Program Criterion-Referenced Test (C.R.T.).*

EVALUATION PROCEDURES

O.E.A./H.S.E.U. obtained norm-referenced test (N.R.T.) scores and attendance from central files. Teachers administered C.R.T. tests at the beginning and end of each term. The evaluation team also interviewed central program staff regarding overall program implementation, as well as implementation of a pilot project, BASIC for Basic Math Skills.

SCOPE OF THIS REPORT

The O.E.A./H.S.E.U. evaluation of the 1985-86 Math Skills program consists of two volumes. This volume contains four chapters. Chapter I includes program background, program objectives, and evaluation procedures. Chapter II is a description of the implementation of the Math Skills Program. Chapter III presents student outcomes. Chapter IV contains conclusions and recommendations. The second volume provides outcome data by school.

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*C.R.T.s include questions arranged in a sequence of increasing difficulty. Scores indicate the level of skill a student has achieved in a specific subject area.

II. PROGRAM IMPLEMENTATION

STUDENT ELIGIBILITY AND TESTING

School administrators selected students eligible for the Math Skills Program in a variety of ways. In most cases, they determined eligibility on the basis of students' scores on the citywide mathematics tests and/or their scores on the R.C.T. in mathematics. A student scoring two or more years below grade level on the citywide mathematics test was automatically eligible, as was a student who failed the R.C.T. The citywide test is given in the fall and spring terms of each year. Students take the R.C.T. at different points in their high school career, beginning in June of the ninth grade. They must pass it in order to graduate. Much of the instruction is therefore directed toward preparing students to take the R.C.T. and providing additional assistance for those students who have failed it.

A certain number of students entering the schools in 1985-86 did not have citywide or R.C.T. scores available to determine their eligibility for the Math Skills Program. These students had not been in the New York City public school system the previous year, had been absent when the test was given, or were not yet eligible to take the R.C.T. In these cases, school administrators determined whether students should participate in the Math Skills Program by using other criteria, such as previous school records, teacher recommendations, in-house diagnostic testing, or students' C.R.T. scores.

STUDENT PROGRAMMING

In 1985-86, the Math Skills Program used two instructional models: the laboratory model (Model A) and the reduced class size model (Model B). Chapter I Model A classes are non-credit bearing; they are taken in conjunction with a tax-levy credit-bearing class. Class size is limited to a maximum of 20 students, individual, small, and whole-group instruction is provided, and an educational assistant works with the teacher. P.S.E.N. classes could be either Model A with no educational assistant or Model B. In P.S.E.N. Model B classes instruction parallels that of tax-levy classes; therefore, credit is given. The teacher, who does not have the help of an educational assistant, conducts the class in the more traditional "whole class" setting, while providing opportunities for remediation.

Administrators at each school made their own programming decisions. They usually programmed students in the lower grades and those with the lowest test scores in Chapter I labs. In fact, program guidelines required that students testing below the sixth grade level be programmed for Chapter I labs. These students received the benefit of the individual attention in lab classes in addition to their required, tax-levy, credit-bearing math class with which the lab is paired. As a result, they had two periods per day of math skills instruction. Administrators usually placed students who had less severe remediation problems and/or who needed assistance to pass the R.C.T. in Model B

classes, where the curriculum paralleled the tax-levy curriculum.

STAFFING AND TRAINING

The assistant principal for math selected the teachers for the Math Skills Program. Staffing varied from school to school. In some cases, program teachers had considerable experience and a particular interest in working with program students. However, finding teachers licensed in math for the program was often difficult. Many funded classes were, in fact, taught by new teachers with the help of educational assistants. Although some teachers taught funded math skills for five periods a day, others had "split" programs which allowed them to teach both funded math skills classes and tax-levy classes.

The Math Skills Program assigned staff development specialists (S.D.S.s) to schools with funded classes. S.D.S.s provided staff development through demonstration lessons, on-site workshops, conferences with teachers and centrally-held training sessions in September and January for Chapter I/P.S.E.N. teachers and paraprofessionals. They visited their schools at least twice a month to provide training and resources and to collect data. They worked particularly closely with less experienced program teachers. In addition, the Math Skills Program provided monthly central training workshops for new and out-of-license program teachers and for teachers in its pilot projects.

BASIC FOR BASIC MATH SKILLS PILOT PROJECT

In addition to providing general remediation, the Math Skills program has periodically introduced pilot projects like Computer Literacy, Math-to-Go, Multi-Media Math, Instrumental Enrichment, and Strategic Reasoning. These pilot projects allow funded teachers to learn and apply new and/or nontraditional approaches to teaching math skills in an attempt to increase student motivation and skills.

During the 1985-85 school year, the program introduced Using Computers, which was revised for the 1985-86 school year into the BASIC for Basic Math Skill Pilot Project, which involved students in learning the computer language BASIC as a means of building student interest in math and learning math skills in remedial classes. In order to get an understanding of how the Math Skills Program designs and implements its innovative projects, O.E.A./ H.S.E.U. looked at this newest pilot project. Staff from the Math Skills funded office developed a manual, homework and classwork sheets, and offered training workshops for pilot teachers. Project students took a non-credit-bearing Chapter I-funded pilot class (Model A) in conjunction with a tax-levy credit-bearing math class.

Early in the fall term, central program staff met with mathematics A.P.s from schools with participating teachers. At that meeting, staff described the criteria for program participation. They required that administrators include only teachers willing to implement the project; that administrators

keep teachers and students in the same program class for the entire year; and that teachers follow in a lock-step way the program manual developed by program staff. Central program staff required all participating teachers to attend two all-day training workshops during fall, 1985 and one during spring, 1986. They also attended a two-hour workshop which was part of the January, 1986 Citywide Staff Development Conference and a June evaluation meeting.

In fall, 1985, 31 teachers from 22 high schools, one outreach center, and one school for pregnant girls began participating in the pilot. By the end of the spring term, however, only four teachers from four high schools had met the criteria for program participation. During the spring term, 12 other teachers attended training sessions but did not meet program criteria for participation; several of these teachers adapted the pilot curriculum to the needs of their own classes.

Teachers discontinued their participation for a variety of reasons. According to the program manager, the main problem was the failure of school administrators to ensure that students would remain in the class for the entire year. In addition, some teachers reported not receiving the administrative support which would have allowed them to have sufficient access to computers and/or to participate in the all-day training sessions. Others preferred a teaching approach which more explicitly focused on preparing students for the R.C.T. Still others found that

improperly-functioning computers impeded their efforts to implement the project.

The Coordinator of Special Projects for the Math Skills program developed a five-unit curriculum package for the BASIC for Basic Math Skills Pilot Project. The unit's lessons are designed to expand the use of the computer in the remedial math class, with the computer functioning as a motivational and instructional tool. Lessons are intended to be taught three times per week, with students receiving an additional two sessions a week of regular lab individualized instruction in basic skills. Teachers can use the lessons even if they do not have an entire lab of computers. Lessons which require hands-on experience contain alternative classroom management strategies for teachers with varying numbers of computers. Puzzle worksheets were provided to insure practice with the concepts learned. Homework questions were provided as well.

III. STUDENT OUTCOMES

O.E.A./H.S.E.U. collected attendance and test results, overall and by school for students who participated in the program during the 1985-86 school year. Data are presented separately for students who participated in the Math Skills Program for a full-year and for those who took part in the program for a single term. This breakdown is necessary since different types of tests are used to assess program effectiveness for full-year and half-year students. Full-year students are tested with standardized norm-referenced tests (N.R.T.s) administered in the fall and spring. N.R.T.s are standardized and nationally normed on a full-year cycle. They are not constructed for use with half-year students. When N.R.T.s are administered to half-year students only a few months apart, the results are uninterpretable. Criterion-referenced tests (C.R.T.s) are used instead of N.R.T.s to measure improvement for half-year students since the results from C.R.T.s are not based on a comparison with a normative sample. The results from C.R.T.s are meaningful at different points in time. C.R.T.s are designed to measure specific skill deficiencies and indicate areas in need of remediation.

Pretest and posttest measures are used to determine student mastery of concepts in basic math skills. Only students with both a pretest and posttest score can be included in these assessments since the impact of the program is determined by gains to the posttest scores from the pretest scores. The

results of full-year students are reported in normal curve equivalents (N.C.E.s).

The evaluation objective of the Math Skills Program stipulates that improvement should be greater than the expected improvement without the "treatment" of the program. To demonstrate progress that is greater than expected, a full-year student must show greater improvement than would be expected by chance and normal academic growth. An actual posttest score above the anticipated posttest score may be attributed to the additional "treatment" of the program. Thus, a full-year student whose posttest score is at a higher N.C.E. than the pretest score has met the evaluation objection. The progress of the half-year students is evaluated in terms of the number of new skills mastered during the course of instruction.

RESULTS FOR FULL-YEAR STUDENTS

During the 1985-86 school year, 13,836 students received mathematics instruction for the full year. The average attendance for all full-year math skills students was 74 percent out of a total of 144 days. Thirty-four percent of these students had valid scores.

In 1985-86, the testing program for New York City public schools was changed so that students took a different math test in the spring than they had in the fall. The Stanford Test of Academic Skills (TASK) was used to assess the mathematics achievement of full-year students in fall, 1985. Level I of this test was administered to ninth- and tenth-grade students. Level

II was used with eleventh and twelfth graders. Scores on the mathematics Regents Competency Test (R.C.T.) a test of minimal competency in mathematics was used as the posttest. Statistical procedures were used to equate scores on the TASK and the R.C.T. Equated scores are reported here. To meet the mathematics objective, 70 percent of full-year students must show a gain between their pretest and posttest N.C.E. scores. This evaluation objective was met. Approximately, 70 percent of the students achieved the necessary increase is performance.

RESULTS FOR HALF-YEAR STUDENTS

While the Math Skills Program is designed to provide a full year of remedial mathematics instruction, many students are dropped from the program after only one term of instruction. The New York City Math Skills Test is the C.R.T. used to measure math improvement for these half-year students. A total of 44,354 students were enrolled in the program for one-half year during the 1985-86 school year. The average attendance of all half-year math skills students was 71 percent out of a total of 72 days in either the fall or the spring term. Of these students, 35 percent had valid scores.*

To meet the evaluation objective, at least 70 percent of the half-year students had to master one new mathematics skill for

*The low percentage of half-year students with valid scores is also probably due to student mobility and programming difficulties.

surpassed. Eighty-one percent of the students mastered the necessary skills.

IV. CONCLUSIONS AND RECOMMENDATIONS

The Funded High School Math Skills Program was successful in meeting its central skills development objectives. The program met its evaluation objectives for both full- and half-year students. Of students with valid scores, approximately 70 percent of full-year students and 81 percent of half-year students met the evaluation objective. At the same time, the low percentage of students reporting both pretest and posttest results continued to raise questions about the usefulness of these data as a measure of program success.

The Math Skills Program continued to provide a range of educational approaches to the teaching of basic skills. During the 1985-86 school year, it extended implementation of a BASIC for Basic Math Skills pilot project. As computers play an increasingly important role in schools and in the larger society, this pilot project helped teachers explore ways to use them to teach students basic math skills.

Based on the evaluation findings, the following recommendations are made:

- Program teachers should establish procedures so that absent students can take C.R.T.s.
- The Math Skills Program should continue to develop innovative pilot projects.